W. WILSON.

His Book

1799

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Vulgar Fractions

بسم الله الرحمن الرحيم

MSS 1309B RB NMAH

A Fraction is a part or parts of the unit, and written with two figures, with a line between them, as $\frac{1}{2}$, $\frac{5}{6}$, $\frac{3}{5}$,

the figure above the line is called the numerator, and the under one the Denominator; which shews how many parts the unit is divided into; and the numerator shews how many of those parts are meant by the fraction.

There are four sorts of Vulgar Fractions; proper, improper, compound, and mixed; viz.

1. A Proper Fraction is when the numerator is less than the denominator, as $\frac{2}{4}$, $\frac{3}{7}$, $\frac{7}{8}$, $\frac{9}{11}$, $\frac{101}{701}$,

2. An improper Fraction is when the numerator is equal to, or greater than the denominator, as $\frac{5}{3}$, $\frac{3}{4}$, $\frac{12}{12}$, $\frac{107}{2}$,

3. A Compound Fraction is the fraction of a fraction, and known by the word of, as $\frac{1}{2}$ of $\frac{2}{3}$ of $\frac{7}{9}$ of $\frac{8}{17}$ of $\frac{2}{12}$,

4. A Mixed number or Fraction is composed of a whole number and fraction, as $8\frac{2}{7}$, $17\frac{1}{2}$, $8\frac{71}{97}$,.

Reduction. 1799

1. To reduce Fractions to a common Denominator

Rul. 1. Multiply each numerator into all the Denominators, except its own, for a new numerator; and all the Denominators for a common denominator,

Or. —

DSI

2. Multiply the common denominator by the several given numerators separately, and divide the product by their several denominators, the quotients will be the new numerators.

Examples
June 10th 1799.

Reduce $\frac{1}{2}$, $\frac{3}{4}$, and $\frac{5}{8}$ to a common denominator

$1 \times 4 \times 8 = 32$
$3 \times 2 \times 8 = 48$
$5 \times 2 \times 4 = 40$
$2 \times 4 \times 8 = 64$

Ans $\frac{32}{64}, \frac{48}{64}, \frac{40}{64}$

Reduce $\frac{7}{8}$, $\frac{4}{6}$, $\frac{9}{10}$, and $\frac{4}{7}$ to a common denominator

$7 \times 6 \times 10 \times 7 = 2940$
$4 \times 8 \times 10 \times 7 = 2240$
$9 \times 8 \times 6 \times 7 = 3024$
$6 \times 8 \times 6 \times 10 = 2880$

$8 \times 6 \times 10 \times 7 = 3360$

Ans $\frac{2940}{3360}, \frac{2240}{3360}, \frac{3024}{3360}, \frac{2880}{3360},$

Reduce $\frac{6}{10}$, $\frac{2}{4}$, $\frac{1}{7}$, and $\frac{3}{4}$ to a common denominator.

$6 \times 4 \times 7 \times 4 = 1008$
$2 \times 10 \times 7 \times 4 = 840$
$1 \times 10 \times 4 \times 4 = 240$
$3 \times 10 \times 4 \times 7 = 840$

$10 \times 4 \times 7 \times 4 = 1400$

Ans $\frac{1008}{1400}, \frac{840}{1400}, \frac{240}{1400}, \frac{840}{1400}$

Reduce $\frac{4}{5}$, $\frac{2}{3}$, $\frac{3}{7}$, and $\frac{1}{8}$, to a common denominator

$4 \times 3 \times 7 \times 8 = 672$
$2 \times 5 \times 7 \times 8 = 560$
$3 \times 5 \times 3 \times 8 = 360$
$1 \times 5 \times 3 \times 7 = 105$
$5 \times 3 \times 7 \times 8 = 840$

Ans $\frac{672}{840}, \frac{560}{840}, \frac{360}{840}, \frac{105}{840}$.

Reduce $\frac{2}{4}$, $\frac{5}{9}$, $\frac{2}{8}$, and $\frac{3}{5}$, to a common denominator

$2 \times 9 \times 8 \times 5 = 720$
$5 \times 4 \times 8 \times 5 = 1200$
$2 \times 4 \times 9 \times 5 = 540$
$3 \times 4 \times 9 \times 8 = 1296$
$4 \times 9 \times 8 \times 5 = 2160$

Ans $\frac{720}{2160}, \frac{1200}{2160}, \frac{540}{2160}, \frac{1296}{2160}$

To reduce a vulgar fraction to its lowest term.

Rule. Find a common measure by dividing the lower term by the upper, and that divisor by the remainder following, till nothing remain; the last divisor is the common measure; then divide both parts of the fraction by the common measure, and the quotient will give the fraction required.

If the common measure happen to be 1, the fraction is already in its lowest term; and when a fraction hath cyphers at the right hand, it may be abbreviated by cutting them off; as, $\frac{340}{1410}$

Reduce $\frac{30}{125}$ to its lowest terms

$$\begin{array}{r|l} 30 & 125 \\ 120 & 4 \\ \hline 5 & 30 \\ 30 & 6 \\ \hline 1\,1 & \end{array}$$

G M $5 \mid \frac{30}{125} = \frac{6}{25}$ Ans^{r}

Reduce $\frac{200}{6004}$ to its lowest terms

$$\begin{array}{r|l} 200 & 6004 \\ 6\,2\,4 & 3 \\ \hline 60 & 200 \\ 100 & 3 \\ \hline 20 & 60 \\ 5\,6 & 2 \\ \hline 4 & 20 \\ 20 & 7 \\ \hline 1\,1 & \end{array}$$

G M $4 \mid \frac{200}{6004} = \frac{52}{1501}$ Ans^{r}

Reduce $\frac{192}{5776}$ to its lowest terms

$$\begin{array}{r|l} 192 & 5776 \\ 5\,7\,6 & 3 \\ \hline 1\,1\,1 & \end{array}$$

G M $192 \mid \frac{192}{5776} = \frac{1}{3}$ Ans^{r}

Reduce $\frac{025}{960}$ to its lowest terms

025)960(1
025
---
135)025(4
010
---
15)135(9
135

...

G. M 15 | $\frac{025}{960} = \frac{5}{64}$ Ans

Reduce $\frac{5104}{6912}$ to its lowest terms

5104)6912(1
5104

1720)5104(3
5104

....

G. M 1720 | $\frac{5104}{6912} = \frac{3}{4}$ Ans

3 To reduce a mixed number to an improper fraction.

Rule. Multiply the whole number by the denominator of the fraction, and to the product add the numerator for a new numerator, which place over the denominator.

To express a whole number fraction-ways, set one for the denominator given.

Reduce $54\frac{13}{22}$ to an improper fraction

$$54\frac{13}{22}$$
$$22$$
$$125$$
$$112$$
$$1245$$
$$22$$

Ans^{r}

Reduce $183\frac{5}{21}$ to an improper fraction

$$183\frac{5}{21}$$
$$21$$
$$183$$
$$3\,66$$
$$3848$$
$$21$$

Ans^{r}

Reduce $13\frac{4}{5}$ to an improper fraction

$$13\frac{4}{5}$$

$$\frac{69}{5}$$ Ans

Reduce $27\frac{2}{9}$ to an improper fraction

$$27\frac{2}{9}$$

$$\frac{245}{9}$$ Ans

Reduce $514\frac{5}{14}$ to an improper fraction

$$514\frac{5}{14}$$

$$3009$$
$$514$$

$$\frac{7229}{14}$$ Ans

4 To reduce an improper fraction to its proper terms.

Rule Divide the upper term by the lower.

Reduce $\frac{1245}{22}$ to its proper terms

22)1245(56 $\frac{13}{22}$ Ans
110
145
132
13
22

Reduce $\frac{3840}{21}$ to its proper terms

21)3840(183 $\frac{5}{21}$ Ans
21
174
168
60
63
5
21

Reduce $\frac{69}{5}$ to its proper terms

$5\overline{)69}$

$13\frac{4}{5}$ Ans^{r}

Reduce $\frac{245}{9}$ to its proper terms

$9\overline{)245}$

$27\frac{2}{9}$ Ans^{r}

Reduce $\frac{8229}{16}$ to its proper terms

$16\overline{)8229}$ ($514\frac{5}{16}$ Ans^{r}

80

22

16

69

64

5

16

5 To reduce a compound fraction to a single one.

Rule. Multiply all the numerators for a new numerator and all the denominators for a new numerator.

Reduce the new fraction to its lowest terms, by Rule 2.

Reduce $\frac{4}{9}$ of $\frac{4}{7}$ of $\frac{11}{12}$ to a single fraction

$5 \times 4 \times 11 = 220 \overset{4\div}{=} \frac{55}{}$

$9 \times 7 \times 12 = 756 = 189$ Ans^{r}

Reduce $\frac{11}{12}$ of $\frac{13}{14}$ of $\frac{21}{29}$ to a single fraction

$11 \times 13 \times 21 = 3003 \overset{21\div}{=} \frac{143}{}$

$12 \times 14 \times 29 = 4872 = 232$ Ans^{r}

Reduce $\frac{3}{4}$ of $\frac{5}{6}$ of $\frac{9}{10}$ to a single fraction

$3 \times 5 \times 9 = 135 \overset{15\div}{=} \frac{9}{12}$ Ans^{r}
$4 \times 6 \times 10 = 240$

Reduce $\frac{4}{5}$ of $\frac{20}{6}$ of $\frac{7}{9}$ to a single fraction

$4 \times 20 \times 7 = 1680 \overset{24\div}{=} \frac{7}{15}$ Ans^{r}
$5 \times 6 \times 9 = 340$

Reduce $\frac{2}{7}$ of $\frac{5}{9}$ of $\frac{9}{10}$ to a single fraction

$2 \times 5 \times 9 = 90 \overset{10\div}{=} \frac{9}{63}$ Ans^{r}
$7 \times 9 \times 10 = 630$

To reduce fractions of one denomination to the fraction another, but greater, retaining the same Value.
Rule. Reduce the given fraction to a compound one, by comparing it with all the denominations between it, and that denomination which you would reduce it to then reduce that compound fraction to a single one.

Wm Shilson began July 24

Reduce $\frac{1}{4}$ of a penny to the fraction of a Pound.

Ans^{r} $\frac{1}{4} \times \frac{1}{12} \times \frac{1}{20} = \frac{1}{960}$

Reduce $\frac{4}{5}$ of a dwt to a fraction of a Pound Troy

Ans^{r} $\frac{4}{5} \times \frac{1}{20} \times \frac{1}{12} = \frac{4}{1200}$

Reduce $\frac{4}{7}$ of a Lb. Avoirdupoise to the fraction of a Cwt

Ans^{r} $\frac{4}{7} \times \frac{1}{20} \times \frac{1}{4} = \frac{4}{560}$

To reduce fractions of one denomination to the fraction of another, but less, retaining the same value,

Rule. Multiply the numerator by the parts contained in the several denominations between it, and that you would reduce it to, for a new numerator, and place it over the given denomination.

Reduce the new fraction to its lowest terms.

Reduce $\frac{1}{960}$ of a Pound to the fraction of a penny

$1 \times 20 \times 12 = 240 \Big| \frac{240}{960} = \frac{1}{4}$ Ans^{r}

Reduce $\frac{4}{1200}$ of a lb. Troy to the fraction of a penny weight

$4 \times 12 \times 20 = 960 \quad \frac{960}{1200} = \frac{4}{5}$ Ans^{r}

Reduce $\frac{4}{704}$ of a Cwt to the fraction of a lb

$4 \times 4 \times 20 = 440 \quad \frac{440}{704} = \frac{4}{7}$ Ans^{r}

To reduce a mixed fraction to a single one.

Rule. When the numerator is the integral part, multiply it by the denominator of the fractional part adding in the numerator of the fractional part for a new numerator; then Multiply the denominator of the fraction by the denominator of the fractional part for a new denominator.

July 25th 1799.

Reduce $\frac{23\frac{5}{7}}{30}$ to a simple fraction

$23 \times 7 + 5 = 166 = \frac{83}{133}$ Ans^{r}
$30 \times 7 \quad = 210$

1

Rule To find the propper quantity of a fraction in the known parts of an integer.

Rule. Multiply the numerator by the common parts of the integer, and divide by the denominator

Reduce $\frac{2}{5}$ of a Shilling to its proper quantity

$2 \times 12 = 24 \div 5 = 4'' \; 3 \div 5$ Ans^{r}

Reduce $\frac{4}{7}$ of a ℔ Avoir dupois to its propor quantity.

$4 \times 16 = 64 \div 7 = 9^{oz} \; 2^{dr} \frac{2}{7}$ Ans^{r}

Reduce $\frac{7}{9}$ of a Cwt to its proper quantity

$7 \times 4 = 28 \div 9 = \overset{qrs}{3} \overset{lb}{3} \overset{oz}{1} \overset{dr}{12} \frac{4}{9}$ Ans^r

Reduce $\frac{2}{5}$ of a lb Troy to its proper quantity

$3 \times 12 = 36 \div 5 = \overset{oz}{7} \overset{dwt}{4}$ Ans^r

Reduce $\frac{5}{9}$ of an ell English to its proper quantity

$5 \times 5 = 25 \div 9 = \overset{qrs}{2} \overset{nails}{3} \frac{7}{9}$ Ans^r

Reduce $\frac{4}{5}$ of a mile to its proper quantity

$4 \times 8 = 32 \div 5 = \overset{fur}{6} \overset{Poles}{14}$ Ans^r

Reduce $\frac{5}{8}$ of an acre to its proper quantity

$5 \times 4 = 20 \div 8 = \overset{\text{roods}}{2} \overset{\text{Poles}}{20}$ Ans^{r}

Reduce $\frac{6}{7}$ of a Hogshead of Wine to its proper quantity

$6 \times 63 = 378 \div 7 = \overset{\text{Galls}}{54}$ Ans^{r}

Reduce $\frac{3}{9}$ of a Barrel to its proper quantity

$3 \times 36 = 108 \div 9 = \overset{\text{Galls}}{12}$ Ans^{r}

Reduce $\frac{5}{12}$ of a Chaldron of coals to its proper quantity

$5 \times 36 = 180 \div 12 = \overset{\text{bushels}}{15}$ Ans^{r}

Reduce $\frac{3}{4}$ of a month to its proper time

$3 \times 4 = 12 \div 5 = \overset{\text{weeks}}{2} \overset{\text{days}}{2} \overset{\text{hours}}{19} \overset{\text{min}}{12}$ Ans^{r}

To reduce any given quantity to the fraction of any greater denomination, retaining the same value.

Rule. Reduce the given quantity to the lowest term mentioned for a numerator, under which set the integral part (reduced to the same term) for a denominator, and it will give the fraction required.

Reduce 4. $3\frac{2}{5}$ to the fraction of a Shilling

$4 \times 4 + 3 = 19 \times 5 + 1 =$
$4 \times 12 = 40 \times 5 =$ $40)\frac{96}{240}\left(\frac{2}{5}\right.$ Ans^{r}

Reduce $9^{oz}\ 2^{dr}\frac{2}{7}$ to the fraction of a lb Avoirdupois

$9 \times 16 + 2 = 146 \times 7 + 2 =$
$16 \times 16 = 256 \times 7$ $256)\begin{matrix}1024\\1792\end{matrix}$ $\frac{4}{7}$ Ans^{r}

Reduce 7 oz. 4 dwt. to the fraction of a Lb Troy

$$7 \times 20 + 4 = 144$$
$$12 \times 20 = 40) \; 240 = \frac{3}{5} \text{ Ans}^{r}$$

Reduce 2 yrs. 3 mo. 1/9 to the fraction of an English Mile

$$2 \times 4 + 3 = 11 \times 9 + 1 = 100$$
$$5 \times 4 = 20 \times 9 = 20) \; 100 = \frac{5}{9} \text{ Ans}^{r}$$

Reduce 1 fur. 16 Pole to the fraction of a mile

$$4 \times 40 + 16 = 256$$
$$8 \times 40 = 40) \; 320 = \frac{4}{5} \text{ Ans}^{r}$$

Reduce 2 roods 20 Pole to the fraction of an acre

$$2 \times 40 + 20 = 100$$
$$4 \times 40 = 20) \; 160 = \frac{5}{8} \text{ Ans}^{r}$$

Reduce 54 Gallons to the fraction of a hogshead of wine

$$9) \; 54 \; (6 = \frac{6}{7} \text{ Ans}^{r}$$

Reduce 12 Gallons to the fraction of a barrel of Beer

$12)\frac{12}{36} = \frac{1}{3}$ Ans^r

Reduce 15 bushels to the fraction of a Chaldron of Coals

$3)\frac{15}{36} = \frac{5}{12}$ Ans^r

Reduce 2^w 2^d 19^h to the fraction of a month.

$2 \times 7 + 2 = 16 \times 24 + 19 = 403 \times 5 + 1 = 2016$

$4 \times 7 = 20 \times 24 = 1072 \times 5 = 6720) 3360 = \frac{3}{5}$

Addition

Rule.

Reduce the given fractions to a common denominator. Then add all the numerators together, under which place the common denominator.

Add $\frac{3}{4}$, $\frac{2}{7}$, and $\frac{5}{6}$, together

$$\frac{3\ 2\ 5}{4\ 7\ 6}$$

$3 \times 7 \times 6 = 126$
$2 \times 4 \times 6 = 48$
$5 \times 4 \times 7 = 140$
$4 \times 7 \times 6 = 168$) 314 ($1\ \frac{146}{168}$ ans^{r}
168
146
168

. Add $\frac{1}{5}$, 4, $\frac{1}{3}$, and $\frac{2}{5}$ together

$$\frac{1}{5} \quad \frac{1}{3} \quad \frac{2}{5}$$

$1 \times 3 \times 5 = 15$
$1 \times 5 \times 5 = 25$
$2 \times 5 \times 3 = 30$
$5 \times 3 \times 5 = 75$ $\quad \frac{70}{75}$ Ans

. Add 7, $\frac{2}{3}$, and $\frac{2}{5}$ together

$$\frac{2}{3} \quad \frac{2}{5}$$

$2 \times 5 = 10$
$2 \times 3 = 6$
$3 \times 5 = 15$ $\quad \frac{16}{15}$ $\quad \frac{1}{0}$
$0 \frac{1}{15}$ Ans

. Add 5, $\frac{2}{3}$, 6, $\frac{7}{8}$, and 4 $\frac{1}{2}$ together

$$\frac{2}{3} \quad \frac{7}{8} \quad \frac{1}{2}$$

$2 \times 8 \times 2 = 32$
$7 \times 3 \times 2 = 42$
$1 \times 3 \times 8 = 24$
$3 \times 8 \times 2 = 48$ $\quad \frac{98}{96}$ $\quad \frac{2}{48}$ $\quad 2+5+6+4=17 \frac{1}{24}$ Ans

Add $\frac{2}{7}$ and $\frac{2}{3}$ of $\frac{3}{4}$ together

$\frac{2}{7}$ $\frac{6}{12}$

$2 \times 12 = 24$
$6 \times 7 = 42$
$7 \times 12 = 84$ $\frac{66}{84} = \frac{11}{14}$ Ans^{r}

When the fractions are of several denominations, reduce them to their proper quantities and add as before.

Add $\frac{3}{4}$ of a Pound to $\frac{5}{6}$ of a Shilling

$3 \times 20 = 60 \div 4 = 15 \text{ " } 0$
$5 \times 12 = 60 \div 6 = 0 \text{ " } 10$
$15 \text{ " } 10$ Ans^{r}

Add $\frac{1}{2}$ of a penny to $\frac{2}{3}$ of a Pound

$1 \times 4 = 4 \div 2 = 0 \text{ " } 0 \text{ } ^{1}/_{2}$
$2 \times 20 = 40 \div 3 = 13 \text{ " } 4$
Shillings $13 \text{ " } 4 \text{ } ^{1}/_{2}$ Ans^{r}

Add $\frac{3}{4}$ of a pound Troy to $\frac{1}{6}$ of an ounce

$3 \times 12 = 36 \div 4 = 9 \text{ oz} \; 0 \; 0$ (pwts, grs)
$1 \times 20 = 20 \div 6 = 0 \; 3 \; 0$

Ounces $9 \; 3 \; 0$ Ans^{r}

Add $\frac{4}{5}$ of a ton to $\frac{5}{6}$ of a lb

$4 \times 20 = 80 \div 5 = 16$ Cwt 0 qrs 0
$5 \times 16 = 80 \div 6 = 0 \; 13 \; 5\frac{1}{3}$

Cwt $16 \; 13 \; 5\frac{1}{3}$ Ans^{r}

Add $\frac{2}{3}$ of a Chaldron to $\frac{3}{4}$ of a bushel

$2 \times 36 = 72 \div 3 = 24$ bush 0 Pecks
$3 \times 4 = 12 \div 4 = 0 \; 3$

Bushels $24 \; 3$ Ans^{r}

Add $\frac{1}{4}$ of a yard to $\frac{2}{3}$ of an inch

$1 \times 36 = 36 \div 4 = 9$ inches barley corns 0
$2 \times 3 = 6 \div 3 = 0 \; 2$

Inches $9 \; 2$ Ans^{r}

Subtraction.

Rule. Reduce the given fractions to a common denominator, then subtract the numerator from the greater, and place the remainder over the common denominator.

2 When the lower fraction is greater than the upper, subtract the numerator of the lower fractions from the denominator, and to that Difference add the upper numerator, carrying one to the units place of the lower whole number.

Wm Wilson August 7th 1799.

From $\frac{5}{8}$ take $\frac{3}{4}$ of $\frac{5}{8}$

First $\frac{3}{4}$ of $\frac{5}{8} = \frac{15}{40} = \frac{3}{8}$

Then $\frac{5}{8} - \frac{3}{8} = \frac{40}{48} - \frac{18}{48} = \frac{22}{48} = \frac{11}{24}$ Ans^r

From $5\frac{2}{3}$ take $\frac{9}{10}$

$5 \times 3 + 2 = \frac{17}{3} - \frac{9}{10} = \frac{170}{27} - 27 - \frac{143}{30} = 4\frac{23}{30}$

From $\frac{30}{47}$ take $\frac{3}{5}$

$30 \times 5 = 190$
$3 \times 47 = 141$
$47 \times 5 = 235$ $\quad 49$
235 Ans^r

From $\frac{19}{20}$ take $\frac{1}{7}$ of $\frac{2}{3}$

$\frac{1}{7} \quad \frac{2}{3} = \frac{2}{21}$

$\frac{19}{20} \quad \frac{2}{21} \quad \frac{399 - 40}{420} = \frac{359}{420}$ Ans^r

From £4 ¼ take ⅔ of ¾

$\frac{2}{3}\ \frac{3}{4} = \frac{6}{12} = \frac{2}{4}$

£4 ¼

4

25 7/4 × ½ $\quad \frac{5\,14 - 4}{8} = 5\,10 = £3\,\frac{7}{4}$ Ans^r

When the fractions are of several denominators reduce them to their proper quantities, and substract as before.

From ¾ of a pound take ¾ of a Shilling

3 × 20 = 60 ÷ 4 = 15 " 0
3 × 12 = 36 ÷ 4 = 0 " 9
S 14 " 3 Ans^r

From ⅔ of Shilling take ½ of a penny

2 × 12 = 24 ÷ 3 = 8
1 × 4 = 4 ÷ 2 = 0 1/2
8 7 1/2 Ans^r

From $\frac{3}{4}$ of a lb Troy take $\frac{1}{6}$ of an Ounce

$3 \times 12 = 36 \div 4 = 9$ oz 0 dwts 0 grs
$1 \times 20 = 20 \div 6 = 0 \;\; 3 \;\; 0$
or $0 \;\; 16 \;\; 16$ Ans

From $\frac{4}{5}$ of a ton take $\frac{5}{6}$ of a lb

$4 \times 20 = 80 \div 5 = 16$ C 0 qrs 0 lbs 0
$5 \times 16 = 80 \div 6 = 0 \;\; 0 \;\; 13 \;\; 5\frac{1}{3}$
$15 \;\; 27 \;\; 2 \;\; 10\frac{1}{3}$ Ans

From $\frac{2}{3}$ of a Chaldron take $\frac{3}{4}$ of a bushel

$2 \times 36 = 72 \div 3 = 24$ bush 0
$3 \times 4 = 12 \div 4 = 0 \;\; 3$
$23 \;\; 1$ Ans

From $\frac{1}{6}$ of a yard take $\frac{2}{3}$ of an inch

$1 \times 36 = 36 \div 6 = 6$ in 36
$2 \times 3 = 6 \div 3 = 0 \;\; 2$
$5 \;\; 1$ Ans

Multiplication.

Rule.

Prepare the given numbers (if they require it) by the rules of Reduction: Then multiply the numerators together for a new numerator, and the denominators for a new denominator.

When any number either whole or mixed is multiplied by a fraction, the product will be always less than the multiplicand, in the same proportion as the multiplying fraction is less than the unit. August 15th 1799.

Multiply $\frac{7}{9}$ by $\frac{2}{3}$

$7 \times 2 = 14$
$9 \times 3 = 27$ Ans^r

Multiply $48\frac{3}{5}$ by $13\frac{5}{6}$

First $48\frac{3}{5} = \frac{243}{5}$
Then $13\frac{5}{6} = \frac{83}{6}$

Then $\frac{243}{5} \times \frac{83}{6} = \frac{20169}{30} = 672\frac{9}{30} = 672\frac{3}{10}$

Multiply $430\frac{6}{10}$ by $18\frac{3}{7}$

$430\frac{6}{10} = \frac{4306}{10}$
$18\frac{3}{7} = \frac{129}{7}$

$\frac{4306}{10} \times \frac{129}{7} = \frac{555474}{70} = 7935\frac{24}{70}$ Ans^r

Multiply $\frac{16}{21}$ by $\frac{2}{4}$ of $\frac{5}{7}$ of $\frac{4}{5}$

$\frac{16}{21} \times \frac{3}{4} \times \frac{5}{7} \times \frac{4}{5} = \frac{960}{2940} = \frac{16}{49}$ ans

Multiply $\frac{9}{10}$ by $\frac{2}{3}$ of $\frac{3}{4}$ of $\frac{5}{6}$

First $\frac{2}{3}$ of $\frac{3}{4}$ of $\frac{5}{6} = \frac{30}{72} = \frac{5}{12}$

Then $\frac{9}{10} \times \frac{5}{12} = \frac{45}{120} = \frac{3}{8}$ ans

Multiply $\frac{3}{4}$ of $\frac{2}{3}$ by $\frac{2}{3}$ of $\frac{1}{3}$

First $\frac{3}{4}$ of $\frac{2}{3}$ of $\frac{1}{3} = \frac{6}{36} = \frac{1}{6}$

Then $\frac{2}{3} \times \frac{1}{6} = \frac{2}{18} = \frac{1}{9}$ ans

Multiply $\frac{1}{4}$ of $\frac{3}{8}$ by $\frac{5}{7}$

First $\frac{1}{4}$ of $\frac{3}{8} = \frac{3}{32}$

Then $\frac{5}{7} \times \frac{3}{32} = \frac{15}{224}$ ans

Multiply $5\frac{6}{7}$ by $\frac{5}{6}$

$5\frac{6}{7} = \frac{41}{7} \times \frac{5}{6} = \frac{205}{42} = 4\ \frac{37}{42}$ Ans^{r}

Multiply 24 by $\frac{2}{3}$

$\frac{24}{1} \times \frac{2}{3} = \frac{48}{3} = 16$ Ans^{r}

Multiply $\frac{3}{4}$ of 9 by $\frac{7}{8}$

$\frac{3 \times 9 \times 7}{4 \times 1 \times 8} = \frac{189}{32} = 5\ \frac{29}{32}$ Ans^{r}

Multiply $9\frac{1}{2}$ by $\frac{2}{4}$

$9\frac{1}{2} = \frac{19}{2} \times \frac{2}{4} = \frac{38}{12} = 3\ \frac{2}{12} = \frac{1}{6}$ Ans^{r}

Division. 1799.

Rule

Prepare the given numbers if the require it by the rules in Reduction, then multiply the denominator of the divisor into the numerator of the dividend for a new numerator and the numerator of the divisor into the denominator of the Dividend for a new denominator.

When any whole number is divided by a fraction less than unity the quotient will be greater than the dividend: but if any fraction be divided by a whole number greater than unity, the quotient will be less than the dividend.

August 22nd. 1799.

Divide $\frac{14}{27}$ by $\frac{2}{3}$

$$3 \times 14 = 42$$
$$2 \times 27 = 54 = \frac{7}{9} \text{ Ans}^r$$

Divide $672\frac{2}{30}$ by $13\frac{5}{6}$

$$672\frac{9}{30} = \frac{20169}{30}$$
$$13\frac{5}{6} = \frac{83}{6}$$

$$\frac{20169}{30} \div \frac{83}{6} = \frac{20169 \times 6}{83 \times 30} = \frac{121014}{2490} = 48\frac{3}{5} \text{ Ans}^r$$

Divide $7935\frac{24}{70}$ by $10\frac{3}{7}$

$$7935\frac{24}{70} = \frac{555474}{70}$$
$$10\frac{3}{7} = \frac{73}{7}$$

$$\frac{555474}{70} \div \frac{73}{7} = \frac{555474 \times 7}{73 \times 70} = \frac{3888318}{9030} = 430\frac{2}{5} \text{ Ans}^r$$

Divide $\frac{3}{5}$ by $\frac{2}{3}$ of $\frac{3}{4}$ of $\frac{5}{6}$

First $\frac{2}{3}$ of $\frac{3}{4}$ of $\frac{5}{6} = \frac{30}{72} = \frac{5}{12}$

Then $\frac{3}{5} \div \frac{5}{12} = \frac{3 \times 12}{5 \times 5} = \frac{36}{40} = \frac{9}{10}$ Ans^r

Divide $\frac{2}{3}$ of 16 by $\frac{5}{7}$ of $\frac{3}{4}$

First $\frac{2}{3}$ of $\frac{16}{1} = \frac{32}{3}$

Then $\frac{5}{7}$ of $\frac{3}{4} = \frac{15}{28}$

$\frac{15}{28} \div \frac{32}{3} = \frac{15 \times 3}{32 \times 28} = \frac{45}{896} = 19\frac{41}{43}$ Ans^r

Divide $\frac{1}{2}$ of $\frac{2}{3}$ by $\frac{2}{3}$ of $\frac{3}{4}$

$\frac{1}{2} \times \frac{2}{3} = \frac{2}{6} \div \frac{6}{12} = \frac{12 \times 2}{4 \times 6} = \frac{24}{36} = \frac{2}{3}$ Ans^r

$\frac{2}{3} \times \frac{3}{4} = \frac{6}{12}$

Divide $9\frac{2}{12}$ by $\frac{1}{2}$ of 7

$9\frac{2}{12} = \frac{110}{12}$

$3\frac{1}{2} = \frac{7}{2}$

$\frac{110}{12} \div \frac{7}{2} = \frac{110 \times 2}{7 \times 12} = \frac{220}{84} = 2\frac{13}{21}$ Ans^r

Divide $\frac{9}{16}$ by $4\frac{1}{2}$

First $4\frac{1}{2} = \frac{9}{2}$ $\left(\frac{9}{2}\right) \frac{9}{16} \left(\frac{18}{144} = \frac{1}{8}\right)$ Ans^r

$\frac{9}{16} \div \frac{9}{2} = \frac{9 \times 2}{9 \times 16} = \frac{18}{144} = \frac{1}{8}$ Ans^r

Divide 16 by 24

$\frac{16}{1} \div \frac{24}{1} = \frac{16 \times 1}{24 \times 1} = \frac{16}{24} = \frac{2}{3}$ Ans^r

Divide $5205\frac{2}{10}$ by $\frac{4}{5}$ of 91

$5205\frac{2}{10} = \frac{52052}{10}$

$72\frac{4}{5} \quad \frac{364}{5}$

$\frac{52052}{10} \div \frac{364}{5} = \frac{52052 \times 5}{364 \times 10} = \frac{260260}{3640} = 71\frac{1}{2}$ Ans^r

Divide $3\frac{1}{6}$ by $9\frac{1}{2}$

$3\frac{1}{6} = \frac{19}{6}$

$9\frac{1}{2} \quad \frac{19}{2}$

$\frac{19}{6} \div \frac{19}{2} = \frac{19 \times 2}{19 \times 6} = \frac{38}{114} = \frac{1}{3}$ Ans^r

THE

Rule of Three

Direct

Rule the numbers as before directed in Reduction so that the first and third may be of the same name multiply the numerator of the first fraction by the denominator of the second and third for a new denominator then multiply the denominator of the first fraction by the numerator of the second and third for a new numerator that fraction will be the answer to the question which reduce to its proper quantity. Or when the three terms are properly reduced proceed as in the Rule of Three of whole Numbers.

Willm Wilson August 29th 1799.

If $\frac{5}{6}$ of a Yard cost $\frac{2}{3}$ of a £ what will $\frac{11}{12}$ of a yd cost

As $\frac{5}{6}$ yd : $\frac{2}{3}$ £ :: $\frac{11}{12}$ yd

Then $\frac{6}{5} \times \frac{2}{3} \times \frac{11}{12} = \frac{132}{180} = \frac{11}{15}$ = 14 s 8 d Answr

If $\frac{3}{4}$ of a Yard of lawn cost 7 s 3 d What will $10\frac{1}{3}$ Yards cost

As $\frac{3}{4}$ yd : 7 s 3 d :: $10\frac{1}{3}$ yds

$10\frac{1}{3} = \frac{31}{3}$

Then $\frac{4}{3} \times \frac{31}{3} = \frac{124}{9}$ = £ 4 : 19 s 10 d $\frac{2}{3}$ Answr

If $\frac{7}{10}$ lb cost $\frac{3}{4}$ s how many pounds will $\frac{8}{9}$ of 1 buy As $\frac{3}{4}$ s : $\frac{7}{10}$ lb : $\frac{8}{9}$

Then $\frac{4}{3} \times \frac{7}{10} \times \frac{8}{9} = \frac{224}{216} = 1\frac{8}{216}$ = 1 lb $\frac{1}{27}$ Answr

If $\frac{3}{5}$ ell of Holland cost $\frac{1}{3}$ £ what will $12\frac{2}{3}$ ells cost at that rate As $\frac{3}{5}$ ell : $\frac{1}{3}$ £ :: $12\frac{2}{3}$ ell

$12\frac{2}{3} = \frac{38}{3}$

Then $\frac{5}{3} \times \frac{1}{3} \times \frac{38}{3} = \frac{190}{27}$ = £ 7 : 0 s 8 d $\frac{3}{4}$ $\frac{15}{27}$ Answr

If $12\frac{1}{2}$ yards of Cloth cost 15 s 9 d what will $48\frac{1}{4}$ yards cost at the same rate

As $12\frac{1}{2}$ yds : 15 s 9 d :: $48\frac{1}{4}$ yds

$12\frac{1}{2} = \frac{25}{2}$

$48\frac{1}{4} = \frac{193}{4}$

Then $\frac{2}{25} \times \frac{193}{4} = \frac{386}{100} =$ £ 3 s 0 d 9 p $\frac{16}{100}$ Ans

If $\frac{9}{10}$ of a Cwt cost 2 £ 4 s what will $7\frac{1}{2}$ Cwt cost at the same rate

As $\frac{9}{10}$ Cwt : 2 £ 4 s :: $7\frac{1}{2}$ Cwt

$7\frac{1}{2} = \frac{15}{2}$

Then $\frac{10}{9} \times \frac{15}{2} = \frac{150}{18} =$ £ 16 s 6 d 8 Ans

If three yards of broad Cloth cost $2\frac{4}{5}$ £ what will $10\frac{2}{7}$ yards cost

As $\frac{3}{7}$ yds : $2\frac{4}{5}$ £ :: $10\frac{2}{7}$ yds

$2\frac{4}{5} = \frac{14}{5}$

$10\frac{2}{7} = \frac{72}{7}$

Then $\frac{1}{3} \times \frac{14}{5} \times \frac{72}{7} = \frac{1008}{105} =$ £ 9 s 12 Ans

If $\frac{1}{4}$ of a Yard cost $\frac{2}{3}$ of a £ what will $\frac{3}{5}$ of a ell English come to at the same rate

As $\frac{1}{4}$ yds : $\frac{2}{3}$ £ :: $\frac{3}{5}$ Ells

Then $\frac{4}{1} \times \frac{2}{3} \times \frac{3}{4} = \frac{24}{12} =$ £ 2 Ans

If 1 lb of Cochneal cost £ 1 " 3 what will 36 7/10 lb come to

As lb : £ 1 " 5 : : 367/10

£ 1 " 5 = 4/5 × 367/10 = 1835/40 = £ 45 " 17 " 6 Ans^r

If 1 Yard of broad Cloth cost £ 3 5/6 what will 4 Pieces cost each containing 27 3/7 yards.

As 1 : 125/6 : : 192/7

Then 1/1 × 125/6 × 192/7 = 24000/56 × 4 = 96000/56 = £ 85 " 14 " 3 3/4 40/56

Bought 3 1/2 Pieces of Silk each containing 24 3/4 ells at 6 " 8 3/4 p^r ell I desire to know what the whole quantity cost

As 1/1 ell : 99/4 : : 7/2 × 195/8

1 × 99 × 7 × 195 / 1 × 4 × 2 × 8 = 397215/64 = £ 25 " 17 " 2 3/4 15/19

If 48 men can build a wall in $24\frac{1}{4}$ days how many men can do the same in 192 days

First $24\frac{1}{4} = \frac{97}{4}$

As $\frac{97}{4} : \frac{48}{1} :: \frac{192}{1}$

$1 \times 48 \times 97 = 4656$

$4 \times 1 \times 192 = 768 = 6\frac{48}{72}$ Ans^{r}

If a penny White loaf weigh $\frac{7}{7}$ when a bushell of Wheat cost 5^{s} 6^{d} what is the bushell worth when the penny White loaf Weighs but $\frac{7}{2}$ 1/2

First $2\frac{1}{2} = \frac{5}{2}$ & 5^{s} 6^{d} = 5 1/2 = $\frac{11}{2}$

As $\frac{7}{1} : \frac{11}{2} :: \frac{7}{5}$

Then $\frac{7}{1} \times \frac{11}{2} \times \frac{7}{5} = \frac{154}{10} = 15^{s}\ 4^{d}\ \frac{4}{5}$ Ans^{r}

What quantity of Shalloon that $\frac{3}{4}$ yard wide will line $7\frac{1}{2}$ Yards of Cloth that is $1\frac{1}{2}$ Yards wide

$7\frac{1}{2} = \frac{15}{2}$

$1\frac{1}{2} = \frac{3}{2}$

As $\frac{3}{2}$; $\frac{15}{2}$ :: $\frac{4}{3}$

Then $\frac{3}{2} \times \frac{15}{2} \times \frac{4}{3} = \frac{180}{12} = 15$ Yds Ans^{r}.

Bought $3\frac{1}{2}$ pieces of Silk each containing $24\frac{3}{0}$ ells at £ 0 0 $3\frac{3}{4}$ pr ell I Desire to know what the whole quantity cost.

First $3\frac{1}{2} = \frac{7}{2}$ and $24\frac{3}{0} = \frac{195}{0}$

Then $\frac{195}{0} \times \frac{7}{2} = \frac{1365}{10}$

Also £ 0 0 $3\frac{3}{4} = \frac{291}{960}$ of a £

ells £ ells

As $\frac{1}{1}$: $\frac{291}{960}$ :: $\frac{1365}{10}$

Then $\frac{1}{1} \times \frac{291}{960} \times \frac{1365}{10} = \frac{397215}{15360} =$ £ 25 0 17 0 2 $\frac{15}{16}$ Ans

Decimals

Wm Sept. 20. 1799

In Decimal fractions the integer or whole thing, as one pound, one Yard, one Gallon, &c. is supposed to be Divided into ten equal parts, and those parts into tenths, and so on Without end.

September 20. 1799.

So that the Denominator of a decimal being always known to consist of an unit with as many cyphers as the Numerator has places, is therefore never set Down; the parts being only distinguished from the whole numbers by a comma prefixed; thus, ,5 which stands for $\frac{5}{10}$, ,25 for $\frac{25}{100}$, ,123 for $\frac{123}{1000}$.

But the different value of figures appears plainer by the following table.

Whole Numbers.							Decimal Parts.						
7	6	5	4	3	2	1	2	3	4	5	6	7
Millions	Hundreds of Thousands	Tens of Thousands	Thousands	Hundreds	Tens	Units	Tenths	Hundredths	Thousandths	Ten Thousandths	Hundred Thousandths	Millionths

From which it plainly appears that as whole numbers increase in a tenfold proportion to the left hand, decimal parts decrease ~~increase~~ in a tenfold proportion to the righ hand: so that cyphers placed before decimal parts decrease their

value by removing them farther from the comma or units place thus, 5 is 5 parts of 10, or $\frac{5}{10}$, ,05 is 5 parts of 100, or $\frac{5}{100}$; ,005 is 5 parts of 1000, or $\frac{5}{1000}$; ,0005 is 5 parts of 10000, or $\frac{5}{10000}$. But cyphers after decimal parts do not alter their value. For ,5, ,50, ,500, &c are each but $\frac{5}{10}$ of the Unit.

A Finite decimal is that which ends at a certain number of Places; but an infinite is that which no where ends

A Recuring Decimal is that wherein one or more figures are continually repeated, as 2, 75222. And 2, 52, 275 275 275 is called a compound Recurring Decimal.

Note, A finite decimal maybe considered as, infinite by making cyphers to recure; for the do not alter the value of the decimal.

In all operations, if the result consists of several nines, reject them, and make the next superior place an unit more thus for 26, 2599 write 26. 26. In all circulating numbers, dash the last figure: thus, as in 86, 54666.

Addition.

Rule.

In setting down the proposed numbers to be added, great care must be taken in placing every figure directly underneath those of the same value, whether they be mixed numbers, or pure decimal parts; and to perform which there must be a due regard had to the commas, or separating points, which ought always to stand in a direct line, one under another, and to the right hand of them carefully place the decimal parts, according to their respective values; then add them as in whole numbers.

Add 30,07 + 2,0071 + 59,4 + 3207,1.

30,07
2,0071
59,4
3207,1

3298,5771

Add 3,5 + 47,25 + 927,01 + 2,0073 + 1,5.

3,5
47,25
927,01
2,0073
1,5

981,2673

Add 52,75 + 47,21 + 724 + 31,452 + ,3075.

52,75
47,21
724,
31,452
,3075

855,7195

Add 3275 + 27, 514 + 1, 005 + 725 + 7, 32.

3275,
27, 514
1, 005
725,
7, 32

4035, 839

Add 27, 5 + 52 + 3, 2075 + , 5741 + 2720.

27, 5
52,
3, 2075
, 5741
2720,

2903, 2816

Subtraction.

Subtraction of Decimals differs but little from whole numbers, only in placing the numbers, which must be carefully observed, as in Addition. 23 17 9 5

From, 2754 take, 2371.

,2754
,2371
,383

From 2,37 take 1,76.

2,37
1,76
,61

From 271 take 215,7.

271,
215,7
55,3

From 270,2 take 76,4075.

270,2
76,4075
193,7925

From 571 take 54,72.

571,
54,72
516,28

From 625 take 76,91

625,
76,91
540,09

From 23.415 take ,3742

23.415
,3742
23,0408

From ,107 take ,0007

107
0007
1063

100

Multiplication

Place the factors, and multiply them as in whole numbers, and from the product towards the right hand cut off as many places for Decimals

as there are in both factors together; but if there should not be so many places in the product, supply the defect with cyphers on the left hand

Multiply 2,071 by 2,27.

2,071
2,27
14497
4142
4142
4,70117

Multiply 27,15 by 25,3

27,15
25,3
8145
13575
5430
68,6895

Multiply 79347, by 23,15

79347,
23,15
396735
79347
2300041
150694
1836803,05

Multiply 17105, by ,3237

17105,
,3237
119735
05525
34210
51315
5571,0985

Multiply 17105, by ,0237

17105,
,0237
119735
51315
34210
0
405,3885

Multiply 27,35 by 7,700 71

27,35
7,700 71
2735
19145
1914500
19145
210,6144105

Multiply 5,721 by ,0075

5,721
,0075
28605
40047
00
,042900 75

Multiply 2,07 by ,007

2,07
,007
1449
00
,01449

Multiply 20,15 by 2705

20,15
2705
10075
140550
4030
54,40575

Multiply ,907 by ,0025

,907
,0025
4535
1814
00
,002267 5

When any number of Decimals is to be multiplied by 10, 100, 1000, &c it is only removing the separating point in the multiplicand so many Places towards the right hand as there are cyphers in the Multiplier: thus, 578 X 10 = 5,78.
578 X 100 = 57,8. 578 X 1000 = 578. 578 X 10000 = 5780.

Division

This rule is also worked as in whole numbers: The only difficulty is in valuering the quotient, which is done by any of the following rules.

Sept^{r} 26th. 1799

Rule 1. The first figure in the quotient is always of the same value with that figure of the Dividend, which answers or stands over the place of Units in the Divisor —

2. The quotient must always have so many Decimal places as the Dividend has more than the divisor

Note 1. if the Divisor and Dividend have both the same number of Decimal parts, the quotient will be a whole number.

2 If the Dividend hath not so many places of Decimals as are in the divisor, then so many cyphers must be annexed to the dividend as will make them equal, and the quotient will then be a Whole number.

3. But if, when the division is done, the quotient as not so many figures as it should have places of Decimals, then so many cyphers must be prefixed as there are places wanting

Divide 48 by, 144

```
,144)48,000(333,
     432
     ---
     400
     432
     ---
      400
      432
      ---
       (40
```

Divide 217,75 by 65,

```
65)217,75(3,35
   195
   ---
    227
    195
    ---
     325
     325
     ---
     ...
     ---

    3,35
      65,
    ------
    1675
   2010
  ------
  217,75
  ------
```

Divide 125, by, 1045

```
,1045)125,0000(1196,17
      1045
      2050
      1045
      10050
       9405
       6450
       6270
       1800
       1045
        7550
        7315
         235
```

```
1196,17
 ,1045
 59 80085
 47 84680
 1196170
       235
 125,000000
```

Divide 709, by 2,574

```
2,574)709,000(275,4
      5140
      19420
      18018
      14020
      12870
      11500
      10296
       1204
```

```
275,4
2,574
11016
19270
13770
5500
 1204
709,0000
```

Divide 5,714 by 0275

```
0275)5,714000(00069
     49650
      74900
      74475
        425
```

```
,00069
 0275
  345
 403
130
552425
5,71400
```

Divide 7302,54 by 6,4252

```
(64252)7302,540000(1140,99
       64252
       -----
        95734
        64252
        -----
        314820
        257008
        ------
         57812 0
         54401 6
         -------
          6410 40
          5702 60
          -------
           627720
           570260
           ------
            49452
```

```
          1140,99
          6,4252
          -------
          229798
        57449 5
      229798
    45955 96
  6 8939 4
        49452
  ---------
  7302,540000
```

Divide, 00516400 by 4323,

```
4323),00516400(,0000197
  4323
 -----
  41934
  38907
 -------
   30270
   30261
 -------
       17
```

```
,0000197
    4323
 --------
 0000591
    394
    591
 --------
 7000 17
 --------
 ,00516400
```

Divide 267,15975 by 1,25

```
1,25)267,15975(213,7270
  250
 -----
   171
   125
 -----
    465
    375
 -------
     909
     875
 -------
      347
      250
 -------
       975
       875
 -------
       1000
       1000
 -------
         .
         .
         .
```

```
213,7270
    125
 ---------
 10680390
  4274556
  2137270
 ---------
 267,15975 0
```

Divide 72, 1564 by, 1347

```
,1347)72,1564(535,6
      6735
      ----
      4006
      4041
      ----
       7654
       6735
       ----
        9190
        8082
        ----
        1108
```

```
   535,6
  ,1347
  -----
   37492
  214424
 160608
 53536
     1108
 -------
 72,15640
```

Divide 715, by, 3075

```
,3075)715,0000(2325,2
      6150
      ----
      10000
       9225
       ----
        7750
        6150
        ----
        16000
        15375
        -----
         6250
         6150
         ----
          100
```

```
   2325,2
    ,3075
   ------
   116260
  162764
 697560
     100
 ---------
 715,00000
```

When numbers are to be divided by 10, 100, 1000, 10000, &c. it is performed by placing the separating point in the dividend, so many places towards the left hand, as there cyphers in the divisor.

Thus, $5704 \div 10 = 570,4$. $5704 \div 100 = 57,04$

$5704 \div 1000 = 5,704$. $5704 \div 10000 = ,5704$

Reduction

To reduce a Vulgar Fraction to a Decimal

Add cyphers to numerator, and divide by the denominator, the quotient is the decimal fraction required

---

Reduce $\frac{1}{2}$ to a decimal

2)1.0(.5 Ans^{r}
10
..

Reduce $\frac{3}{4}$ to a Decimal

4)3.00(.75 Ans^{r}
28
20
20
..

Reduce $\frac{3}{8}$ to a Decimal

8)3,000(.375 Ans^{r}
24
60
56
40
40
..

Reduce $\frac{5}{26}$ to a Decimal

26)5,0000000(1923076+ans^r

26
240
234
60
52
80
78
200
182
180
156
24

Reduce $\frac{11}{14}$ of $\frac{10}{13}$ to a Decimal

1092)110,0000000(1007326+ans

1092
6080
7280
7920
5460
24600
21840
27600
25480
21200
18200
30000
27300
2700

14
13
32
14
172

Note, if the given parts are of several denominations they may be reduced either by so many distinct operations as there are different parts or by First reducing them into their lowest denominations and then divide as before; or,

2dly, Bring the lowest into Decimals of the next superior denomination, and on the left hand of the decimal found place the parts given of the next superior denomination; so proceeding till you bring out the Decimal parts of the highest integer required by still dividing the product by the next superior denominator; or,

3dly, To reduce shillings, pence, and farthings
if the number of Shillings be even, take half
for the first place of decimals and let the second
and third places be filled up with the farthings
contained in the remaining pence and farthings
always remembring to add 1, when it is or exceeds
25. But if the number of Shillings be odd the
second place of Decimals must be increased by
5. Next divide half the number of farthings
in the pence and farthings (rejecting 24 or 48
if there be 48) by 12; the quotient, written after
the 3 places before found will give the decimal
required.

Reduce 5ˢ to the decimal of a £

20)5,00
25

Reduce 9ˢ to the decimal of a £

20)9,00
45

Reduce 16ᵈ to the decimal of a £

20)16,0
0

Reduce 8ˢ 4ᵈ to the decimal of a £

12)4,
20)0,333
416

Reduce 19 s. 5 d. to the Decimal of a £.

2	1
12	5, 5
20	19. 4583331
	972916

Reduce 12 grains to the Decimal of a lb Troy

24	12,0
20	5
12	025
	0020003+

Reduce 12 Drams to the Decimal of a lb Avoirdupoise

16	12,00
16	75
	046875

Reduce 2 qr. 14 lb to the decimal of an Cwt

28	14,0
4	2,5
	,625

Reduce 2 furlongs to the decimal of a league

0	2,00
3	,25
	00333+

Reduce 2 quarts 1 pint to the decimal of a Gallon

2	1,0
4	2,5
	,625

Reduce 4 gallons 2 quarts of wine to the decimal of a hogshead

4	2,0
63	4,5
	,071420+

Reduce 2 Gallons 1 quart of beer to the decimal of a barrel

4	1,00
36	2,25
	,0625

Reduce 52 days to the decimal of a Year

365	52,0
	,014246 5+

To find the value of any Decimal Fraction in the known parts of an integer

Rule. Multiply the decimal given, by the number of parts of the next inferior denomination cutting of the decimals from the product; then multiply the remainder by the next inferior denomination; thus proceeding till you have brought in the least known parts of the integer

What is the value of ,002004 of a lb Troy

,002004
12
,025000
20
,500160
24
2000640
1000320
12,0030400

What is the value of ,046075 of a lb Avoirdupoise ,046075

16

201250
046075

0,750000

16

4500000
750000

12,000000

What is value of ,025 of a Quot

,025

4

2,500

20

4000
1000

14,000

What is the value of ,025 of a Gallon

025

4

2,500

2

1,000

What is the value of ,071420 of a hogshead of wine

,071420
63
214204
428560
4,499964
4
1,999856

What is the value of ,0625 of a barrel of beer

,0625
36
3750
1875
2,2500
4
1,0000

What is the value of ,142465 of a year

,142465
365
712325
854790
427395
51,999725

(5) Reduce 4/5 of 2/3 of 36 lb to its equivalent Value in Decimals

$$4/5 \times 2/3 \times 36/1 = \frac{288}{15} = \frac{96}{5} \quad 5\overline{)96,0} \quad 19,2$$

What will be the Value of ,525 of an Cwt expressed as a Vulgar Fraction, and what is Value when properly reduced?

,525
4
2,100
20
20
16
120
16
120

Ans^r

$\frac{525}{1000} = \frac{105}{2000} = \frac{21}{40}$ The Vulgar Fraction req^d

Ans^r 2 qrs 2 lb 12 oz 12,8 the Value

Reduce 1°. 3. 21. 3. 2. 10. 2 to the Decimal of a Degree?

3	2,000000
12	10,666666
3	2,000000 8+
5	3,946296 26+
5,5 = 11	,792592 5+
40	21,072053 01
0	3,526400 13+
29,5	17,440050 1 (59/215

1475
2490
2655
350
295
635
590
450
295
1551
1475
76

Rule of Three

What will the pay of 540 men come to at £. 5. 9 pr man

12)9,0
20)5,5
1,275

As 1m : 1,275 :: 540m

540
51000
6375
680,500
20
10,000 Ans £680 " 10

If 7 3/4 yards of cloth cost £2 " 12 " 9 what will 140½ yards of the same cost

4)3,00 4)2,0 12)9,00
7,75 140,5 20)12,75
2,4375

As 7,75yds : 2,4375 £ :: 140,5

1405
131075
1055000
26375
7,75)3705,6075(47,815
3100 20
6056 16,30
5425 4
6315 3,4
6200 4
1157 2,4
775
3825
3875
250

Ans £47 " 16 " 3½

If a chest of Sugar weighing £ Cwt lb £
7 " 2 " 14 cost 36 " 12 "
what will 2 " 1 " 21 of the same cost

20)140 12)9,00 20)21,00
4) 2,5 20)12,75 4) 1,75
7,625 36,6375 2,4375

As 7,625 : 36,6375 :: 2,4375

2,4375
1031875
2564625
1099125
1465500
732750

7,625)8930390625(11,711909
7625 20
13053 14,239060
7625 12
54209 2,075720
53375 4
9140 3,502880
7625
15156
7625
75312
68625
66075
61000
5075

£ s d
Ans 11 " 14 " 2 3/4

ton cwt qrs lb oz £
1 grocer 24 " 12 " 2 " 14 " 12 of tobacco for 3670 "
sold
6 " 4 what will 1 oz come to

ton cwt qrs lb oz
24 " 12 " 2 " 14 " 12

20
492
1970
20
15774
3940
551174
16
331056
551174
002796

12)4,0000000
20)6,3333333
3670,3166666

£
As 002796 oz : 3670,3166666 :: 1 oz
1

002796)3670316666666(0041666 20
3531104 0,0033320
1471326 12
002796 9999040
5005306 4
5296776 3,9999360
5005306
5296776
5005306
5296776
500530

Ans^r 3/4, 99998 = 1 nearly

What is the worth of 19 oz. 3 wt. 5 gr. of Gold at £ 2 . 19 s

per oz

24 { 4 | 5,00
     6 | 1,25,000
  20 | 3,20,0533+
     | 19,160416+

20 | 19,00
   | 2,95

As 1 oz : 2,95 :: 19,160416

2,95
95002000
17244374
30320032
56,52322720
20
10,46454400
12
5,574520
4
2,290112

Ans £ 56 . 10 . 5 . 2

£
If I lent my friend 34 for $\frac{5}{8}$ of a Year how
much ought he to lend me $\frac{5}{12}$ of a Year to requite
my kindness

8)5,000
,625

12)5,000
,416

£ £ ℔
As ,625 : 34 :: ,416
34
2500
1875
£
416)21250(51 Ans
2000
450
416
34

If 1 oz of Silver cost 5" 6 what is the Price of a tankard that weighs 1 lb 10 oz 10 dwts 12 grs

24 { 4 | 4,0
     6 | 1,00000
  20 | 10,16666+
     22,50033+

12 | 6,0
20 | 5,500
   ,275

As 1 oz : ,275 £ :: 22,50033 oz
                    ,275
                  112541 65
                 157550 31
                 45016 66
                6,10979075
                          20
                3,79501500
                          12
                9,54970 0
                          4
                2,19912

Ans £ 6 " 3 " 9 1/2

If 1 ℔ Currans cost £ 2 " 9 " ₵ what will
45 " 3 " 14 cost at the same rate

12)60
20)9,600
2,475

20)14,0
4)3,500
45,075

₵ £ £
As 1 : 2,475 :: 45,075
2,475
22 9 3 75
3 2 1 25
1 0 3 5 0 0
9 1 7 5 0
113,540625
20
10,012500
12
9,17500
4
3,00
£
Ans 113 " 10 " 9 3/4

Bought a tankard for £10 - 12 at the rate of 5 - 4 pr ounce what was the weight

20)12,0
10,6000

12)4,0000
2,0)5,3333
,2666

As, 2666 : 1 :: 10,6000 / £ £

2,666)10,6000(39 oz 15 dwts ans
7990
26020
23994
2026
20 dwts
2664)40520(15
2664
13060
13330
430

Bought 29 lb 4 oz coffee for 10 £ 15 s 3 d what is the value of 3 lb

4)1,00
29,25

12)3,00
20)11,2500
10,5625

As 29,25 lb : 10,5625 £ :: 3 lb

29,25)3,160875(1,00333+
2925
24375
23400
9750
9750
9750
9750
20
1,66663
12
7,99956
4
3,99824

Ans 1 £ 1 s 0 d nearly

THE Square Root

Extracting the Square Root is to find out such a number as being multiplied in itself, the product will be equal to the given number. Nov^r 10^th 1799

Rule 1st Point the given number, beginning at the unit's place, the to the Hundreds, and so upon every second figure throughout.

2.dly Seek the greatest square number in the first point towards the left Hand, placing the square number under the first point, and the root thereof in the quotient; subtract the Square number from the first point, and to the remainder bring down the next point, and call that the Resolvend.

3.dly Double the quotient, and place it for a divisor on the left Hand of the resolvend, seek how often the divisor is contained in the resolvend (preserving always the units place and put the answer in the quotient, and also on the right Hand side of the divisor

Then multiply by the figure last put in the quotient, and subtract from the resolvend; bring down the next point to the remainder if there be any more and proceed as before.

Roots	1.	2,	3,	4.	5.	6.	7.	8.	9.
Squares	1	4,	9.	16.	25.	36.	49.	64.	81.

Examples.

What is the square root of 106929

106929(327 ans^r

9

62)169

124

647)4529

4529

...

327

327

2209

654

981

106929

What is the square root of 2260741.

$$
\begin{array}{r}
\dot{2}2\dot{6}0\dot{7}41 \,|\, 1506,23 + \text{ans} \\
1 \\
\hline
25 \,|\, 126 \\
125 \\
\hline
3006 \,|\, 10741 \\
10036 \\
\hline
30122 \,|\, 70500 \\
60244 \\
\hline
301243 \,|\, 1025600 \\
903729 \\
\hline
121871
\end{array}
$$

$$
\begin{array}{r}
1506,23 \\
1506,23 \\
\hline
451069 \\
301246 \\
90373 \\
7531150 \\
150623 \\
\hline
2260741,0000
\end{array}
$$

What is the square root of 7596796

7596796 (2756, 220 + anr

4

47) 359
329

545) 3067
2725

5506) 34296
33036

55122) 126000
110244

551242) 1575600
1102484

5512440) 47311600
44099504
3212016

2756,220
2756,220

22049024
5512456
551245
14537360
1378114
192359
55124
3212016

7596796,000000

What is the square root of 36372961

36 37 29 61 (6031 ans
36
1203) 37 29
3609
12061) 12061
12061
.....

6031
6031
6031
10993
361860
36372961

What is the square root of 22071204

22 07 12 04 (4690 ans
16
86) 607
516
929) 9112
8361
9380) 75104
75104
.....

4690
4698
37504
422282
201800
187920
22071204

When the given number consists of a Whole number, and decimals together make the number of decimals even, by adding cyphers to them; so that there may be a point fall on the units place of the whole number

What is the square root of 3271,4207

```
 3271,4207 (57,19+&c
25
107) 771
     749
1141) 2242
      1141
11429) 110107
       102961
         7246
```

```
 57,19
 57,13
------
 5 1 4 7 1
   5 7 1 9
 4 0 0 3 3
 2 0 5 9 5
     7 2 4 6
------------
 3271,4207
```

What is the square root of 5.

5(2,236067 + ans

4

42)100
84

443)1600
1329

4466)27100
26796

44706)304000
268236

4472127)35676400
31304889

4371511

2,236067
2,236067

15652469
13416402
134164020
6708201
44721340
44721340
4371511

5,000000000000

What is the square root of 4,372594

4,372594(2,091 + Ans

4

409) 372
3681

4101) 4494
4101

313

2,091
2,091
2091
10919
41020
313

4,372594

What is the square root of 2,2710957

2,2710957(1,50701 + Ans

25) 127
125

3007) 21095
21049

301401) 4670000
3014401

165599

1,50701
1,50701
150701
10549070
7535050
150701
165599

2,2710957008

What is the square root of ,00032754.

```
,00032754(,01009 + anr
    1                  ,01009
20)227                 01009
   224                 -----
   -----               16201
    35400          144720
    32401          01009
    -----          00000 2919
     2919          -----------
                   ,00032754 00
                   -----------
```

To extract the square root of a Vulgar Fraction.

Rule. Reduce the Fraction to its lowest terms: then extract the square root of the numerator for a new numerator and the square root of the denominator for a new denominator.

if the fraction be a surd (i. e.) a Number where a root can never be exactly found, reduce it to a decimal and extract the root of it.

Examples

What is the square root of $\frac{2304}{5184}$.

(576)

First $\frac{2304}{5184} = \frac{4}{9}$

Then $\sqrt{\frac{4}{9}} = \frac{2}{3}$ Ans^{r}

What is the square root of $\frac{2704}{4225}$

$$\begin{array}{r|l} 2704 & 52 \\ 25 & \\ \hline 102 \;|\; 204 & \\ 204 & \\ \hline \cdots & \end{array} \qquad \begin{array}{r|l} 4225 & 65 \\ 36 & \\ \hline 125 \;|\; 675 & \\ 625 & \\ \hline \cdots & \end{array}$$

Hence $\sqrt{\frac{2704}{4225}} = \frac{52}{65}$

And $\frac{13}{\cancel{52}\,4} = \frac{4}{5}$ Ans^{r}

What is the square root of $\frac{9216}{12544}$

$$\begin{array}{r|l} 9216 & 96 \\ 81 & \\ \hline 186 & 1116 \\ & 1116 \\ \hline & \cdots \end{array} \qquad \begin{array}{r|l} 12544 & 112 \\ 1 & \\ \hline 21 & 25 \\ & 21 \\ \hline 222 & 444 \\ & 444 \\ \hline & \cdots \end{array}$$

Hence $\sqrt{\frac{9216}{12544}} = \frac{96}{112}$

and $\frac{16}{96} = \frac{6}{7}$ ans

Surds

What is the square root of $\frac{357}{476}$

```
474)3570(75          75(86602 + ans
   3332                64
   ----              ----
    2300            164)1100
    2300               996
    ----             ------
     ---            1726)10400
                        10356
                      ------
                     173202)44000
                            34640 4
                            -------
                             93596
```

What is the square root of $\frac{47}{549}$.

```
549)4700(.0704 7095          .8706 7395(.93309 + ans
   4392                       81
   ----                      ----
    3000                    103)606
    3043                       549
    ----                    ------
     3700                  1063)5773
     3294                     5589
     ----                  ------
      4060                 18660 9)104 9500
      3043                      167 9481
      ----                  ------------
       2170                   170019
       1647
       ----
        5230
        4941
        ----
         2890
         2745
         ----
          145
```

To extract the Square root of a mixed number

Rule 1st Reduce the fractional part of the mixed Number to its lowest term and then the mixed number to an improper fraction.

2 Extract the roots of the numerator and denominator for a new numerator and denominator if the mixed number given be a surd, reduce the fractional part to a decimal, annex it to the whole number and extract the square root thereof.

Examples

What is the square root of $27\frac{9}{16}$.

First $27\frac{9}{16} = \frac{441}{16}$

Then $\sqrt{\frac{441}{16}} = \frac{21}{4} = 5\frac{1}{4}$ Ans^{r}

What is the square root of $9\frac{43}{49}$.

First $9\frac{43}{49} = \frac{484}{49}$

Then $\sqrt{\frac{484}{49}} = \frac{22}{7} = 3\frac{1}{7}$ Ans^{r}

Surds

What is the square root of $0\frac{5}{7}$.

7)5,000000
0,714205

0,714205(2,9519+ Ans^{r}

4
49)471
441
505)3042
2925
5901)11705
5901
59029)580400
531241
57159

What is the square root of $6\frac{2}{5}$.

$5)\underline{2,0}$
$\underline{6,4}$

$6,40(2,5298+$ ans

4
$45)240$
225
$502)1500$
1004
$5049)49600$
45441
$505\,00)415900$
404704
$(\cdot 11196)$

To find the mean Proportional Value between any two given numbers

Rule The square root of the product of the given numbers is the mean proportional sought.

Examples

What is the mean proportional between 4276 and 842.

4276
842

05552
17104
34200

3600392

3600392 (1897,4 + ans
1
---
20) 260
224
---
349) 3603
3321

3797) 28292
26509

37944) 178300
151776

26524

To find the side of a Square equal in area to any given superfices

Rule. The square root of the content of any given superfices, is the square equal sought.

Examples.

If the content of a Circle be 160 what is the side of the square.

√160 (12,649111 + &c

1

22) 60
44

246) 1600
1476

2524) 12400
10096

25289) 230400
227601

252901) 2799900
2529001

2529021) 26919900
25290211
1688789

If the area of a circle is 750 what is the side of the square equal to

750(27,30612 + ans

4

47)350
329

543)2100
1629

5460)47100
43744

54766)335600
320596

547721)700400
547721

5477222)15267900
10954444

4312456

Any two sides of a right-angled triangle given to find the third side.

1st The base and perpendicular given to find the hypothenuse

Rule the square root of the sum of the squares of the base and perpendicular is the length of the Hypothenuse

2nd The hypothenuse and perpendicular given to find the base

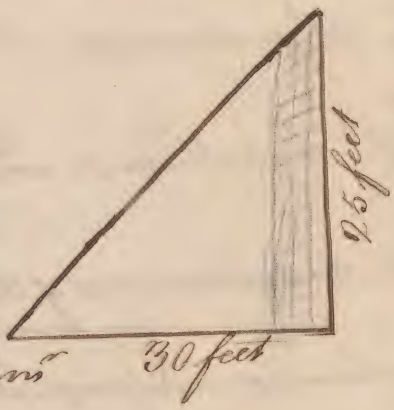
Rule. The square root of the difference of the squares of the hypothenuse and perpendicular is the length of the base.

3rd The base and hypothenuse given to find the perpendicular

Rule. The square root of the difference of the squares of the Hypothenuse and the base is the height of the perpendicular

The wall of a town is 25 feet high which is surrounded by a moat of 30 feet in breadth I desire to know the length of a Ladder that will reach from the outside of the moat to the top of the wall

25	30
25	30
125	900
50	625
625	1525



1525 (39.05 + Ans

9

69) 625

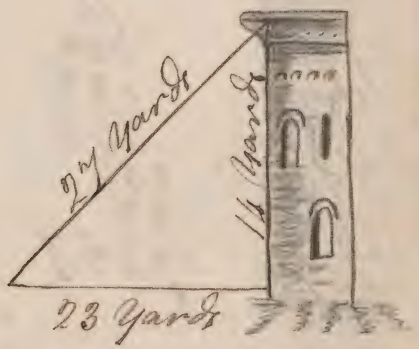
621

7005) 40000

39025

(.975)

A line 27 Yards long will exactly reach from the top of a Fort to the opposite Bank of a River known to be 23 yards broad The Height of the wall is required.



27	23
27	23
189	69
54	46
729	529
529	
200	

Ans

200(14,14213 Ans

1

24)100
96

281)400
281

2824)11900
11296

28282)60400
56564

282841)303600
282841

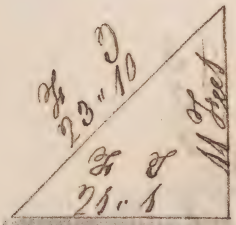
2828423)10075900
8485269

1590631

Required the Length of a Shore that being to strut 11 Feet from the Upright of a Building will support a Jamb 23 F. 10 I. from the Ground

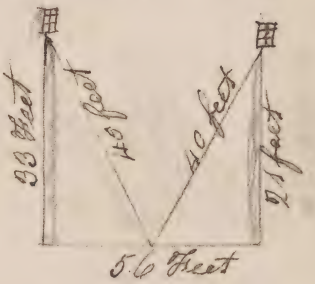
F. I.
23 " 10
12

206	11
206	12
1716	132
2200	132
572	264
81796	396
17424	132
64372	17424



12
64372 (253
F 21 " 1 Answ^r
4
45) 243
225
503) 1072
1509
563

A Ladder 40 Feet long may be so planted that it shall reach a Window 33 Feet from the Ground on one side the Street and without moving it at the foot will do the same by a Window 21 feet high on the other side the breadth of the street is required



40 × 40 = 1600
33 × 33 = 1089
1600 − 1089 = 511

511 (22,605
4
42) 111
04
446) 2700
2676
45205) 240000
226025
13975

40 × 40 = 1600
21 × 21 = 441
1600 − 441 = 1159

1159 (34,04
9
64) 259
256
6004) 30000
27216
2784

22,605 × 45 = 1,016,725 Acres

The Height of an Elm growing in the middle of a curcular Island 30 Feet in Diamiter plumps 53 and a line streched from the Top of the Tree strait to the hither of the Water 112 Feet What Ther is the breadth of the moat supposing Land on the ther side the Water to be level

53 53 159 265 2809

112 112 224 1232 12544 2009 9735

9735 (99,66 ft
81 15
100) 1635 (103,66 Answ
1504
1966) 13100
11796
19726) 130400
110356
12044

Suppose a Light house built on the Top of a Rock the Destance between the place of Obervation and that Part of Rock Level with the Eye and Directly under the building is given 310 Fathoms the Distance from the Top of the Rock to the place of Obervation is 423 Fathoms and from the Top of the Building 425 The Height of the Edifice is required

310
310
3100
930
96100

425
425
2125
850
1700
100625
96100
04525

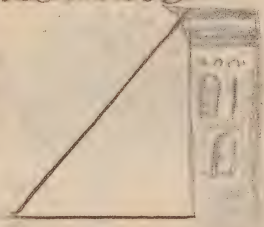
423
423
1269
846
1692
178929
96100
02029

04525 (290,73
4
49) 445
441
5007) 42500
40649
50143) 185100
174429
10671

02029 (207,0
4
40) 420
304
567) 4429
3969
5740) 46000
45904
... 16

207,0
2,93 Ans$

A Castle Wall there was whose Height was found
To be an Hundred feet from the Top to the Ground
Against the Wall a Ladder stood Upright
Of the same length the Castle was in Height
A waggish Youth did the Ladder slide
The Bottom of it Ten feet from the Side
Now I would know how far the Top did fall
By pulling out the Ladder from the wall



100 / 100 / 10000 / 100 / 19900

17 / 10 / 100

99,00 (99.49074

01

109 | 1000 — 1701

1904 | 9900 — 7936

19009 | 196400 — 179001

190900 | 1739400 — 1491604

1909967 | 24779600 — 13430769

19099744 | 1134830100 — 795909976

(72041124)

100
99,49074
,50126
12
Inches 6,01512 Ans

As I was Walking out one Day
Which happened on the first of May
As Luck would have it I did spy
A May Pole raised up on high
The which at first me much surpris'd
Not being before hand advertis'd
Of such a Strange uncommon sight
I said I would not stir that night
Nor rest content until I'd found
Its Height exact from of the Ground
But when these words I just had Spoke
A Blast of Wind the May-Pole broke

Whose broken piece I found to be
Exact in length yards Sixty three
Which by its fall broke up a Hole
Twice fifteen yards from of the Pole
But this being all that I can do
The May-Pole now being broke in two
Unequal Parts to aid a friend
Ye Youth pray then an Answer send

30
30
900

63
63
189
370
3969
900
3069

3069 (55, 3905
25
105) 569
525

1103) 4400
3309
11069) 109100
99621
110700) 947900
906304
1107965) 61599600
55398025
619775

63
55, 3905
110, 3905
3
1, 1955
12
2, 3460

yds ¾ ½
110 - 1 - 2 ans

Cube Root.

Febr. 12th 1802

To extract the cube root is to find out a number which being multiplied into itself and then into that product produceth the given number

Rule 1. Point every figure of the cube given begining at the units place with the greatest cube

to the first point and Substract it therefrom put the root in the quotient and bring down the figures in the next point to the remainder for a resolvend 2 Find a Dovisor by Multiplying the square of the quotient by 3. See how often it is contained in the resolvend rejecting the units and tens and put the answer in the quotient 3rd To find the substraend. 1. Cube the last figure in the quotient 2. Multiply all the figures in the quotient by 3 except the last and that product by the square of the last 3. Multiply the divisor by the last figure. Add these products together gives the substraend which substract from the resolvend to the remainder bring down the next point and proceed as before

What is the Cube root of 389017.

389017 (73 ans
343
7x7x3=147 | 46017
27 Cube of 3
189 7x3x by Sqr of 3
441 Divisor x by 3
46017

73
73
219
511
5329
73
15987
373 03
389017

What is the cube root of 5735339

5735339 (179 Ans

1

Sqr of 1 X 3 = 3 | 4735 resolvend

343 Cube of 7

147 1 X 3 X by Sqr of 7

21 Divisor X by 7

Divisor 3913 subtracend

Sqr of 17 X 3 = 867 | 022339 resolvend

729 Cube of 9

4131 17 X 3 X Square of 9

7003 Divisor X by 9

022339 subtracend

179

179

1611

1253

179

32041

179

208369

224207

32041

5735339

What is the Cube root of 84604519

84604519 (439 Answ

Divisor 64 Cube of 4
Sar of 4x3 = 48 | 20604 resolvend
27 Cube of 3
100 4x3x by Sar of 3
144 Divisor x by 3
15507 subtraend

Divisor
Sar of 43x3 = 5547 | 5097519 resolvend
729 Cube of 9
10449 43x3x by Sar of 3
49923 Divisor x by 9
5097519 subtraend

439
439
3951
1317
1756
192721
439
1734489
577163
770004
84604519

What is the Cube root of 259694072

259694072 (630 ans^r

Divisor 216 Cube of 6

Sq^r of 6 x by 3 = 108 | 43694 resolvend

27 Cube of 3

162 6 x by 3 x by Sq^r of 3

324 Divisor x by 3

34047 subtrahend

Divisor

Sq^r of 63 x 3 = 11907 | 9647072 resolvend

512 Cube of 0

12096 63 x by 3 x by Sq^r of 0

9 x 256 Divisor x by 0

9647072 subtrahend

630

630

5104

1914

30 20

407044

630

3256352

12211132

244226 4

259694072

What is the Cube root of 27054036000

27054036000 (3002 Ansr
27
Divisor
Sq of 300 x 3 = 27000) 054036000 resolvend
0 Cube of 2
3600 300 x 3 x by Sq of 2
540000 Divisor x by 2
54036000 subtrahend

3002
3002
6004
900 - 600
901200 4
3002
1002400 8
27036012 00
27054036000

What is the Cube root of 22069010125

22069010125 (2805 Ans
8
Divisor
Sq of 2 x 3 = 12) 14069 resolvend
512 Cube of 8
384 2 x 3 x by Sq of 8
96 Divisor x by 8
13952 subtrahend
Divisor
Sq of 280 x 3 = 235200) 117010125 resolvend
125 Cube of 5
21000 280 x 3 x by Sq of 5
117600 Divisor x by 5
117010125 subtrahend

2805
2805
14025
224400
5610
7860025
2805
39340125
6294420000
15736050
22069010125

What is the Cube root of 21936532 7791

21936532 7791 (6031 Ans.
216
Divisor
Sq of 60×3 = 10800) 336532 resolvend
27 Cube of 3
1620 60×3×Sq of 3
324000 Divisor × by 3
3256227 subtrahend
Divisor
Sq of 603×3 = 1090027) 109100791 resolvend
1 Cube of 1
1809 603×3×Sq of 1
1090027 Divisor × by 1
109100791 subtrahend

6031
6031
6031
10093
361860
36372961
6031
36372961
10911 0093
218237766 0
21936532 7791

1 When the given number consists of a Whole number and decimal together make the number of decimals consist of 3, 6, 9 &c. places by adding cyphers thereto so that there may be a point fall in the unit's place of the whole number

What is the Cube root of 12,977875

12,977875 (2,35 Ans

Divisor
Sq of 2 X 3 = 12) 4977 resolvend
977 Cube of 3
54 2 X 3 X Sq of 3
36 Divisor x by 3
4167 subtrahend

Divisor
Sq of 23 X 3 = 1587) 810875 resolvend
125 Cube of 5
1725 23 X 3 X Sq of 5
7935 Divisor x by 5
810875 subtrahend

2,35
2,35
1175
705
470
5,5225
235
27625
16575
11050
12,977875

What is the Cube root of 001906624

001 906 624 (124 Ans
1
Divisor
Sq of 1 X 3 = 3) ... 906 resolvend
0 Cube of 2
12 1 X 3 X Sq of 2
4 Divisor X by 3
728 subtrahend
Divisor
Sq of 12 X 3 = 432) 178624 resolvend
64 Cube of 4
576 12 X 3 X by Sq of 4
1728 Divisor X 4
178624 subtrahend

124
124
496
248
124
15376
124
61504
30752
15376
1906624

What is the Cube root of 15926.972504

15926.972504 (25.16 + ans^r

Divisor 8
Sq of 2 X 3 = 12 | 7926 resolvend
125 Cube of 5
150 2 X 3 X by Sq of 5
60 Divisor X 5
7625 subtrahend

Divisor
Sq of 25 X 3 = 1875 | 301972 resolvend
1 Cube of 1
75 25 X 3 X Sq of 1
1875 Divisor X 1
100251 subtrahend

Sq of 251 X 3 = 189003 | 113721504 resolvend
216 Cube of 6
27100 251 X 3 X Sq of 6
1134018 Divisor X 6
113673096 subtrahend
48408 resolvend

25.16
25.16
15096
2516
12580
5032
633025 6
2516
3776 01536
6330256
31651200
12640512
404008
15926.972504

To extract the Cube root of a Vulgar Fractions

Rule Reduce the fraction to its lowest terms, then extract the cube root of its numerator and denominator for a new numerator and denominator but if the fraction be a surd reduce it to a decimal and then extract the root from it

What is the Cube root of $\frac{250}{686}$.

First $\frac{250}{686} = \frac{125}{343}$

Then $\sqrt[3]{\frac{125}{343}} = \frac{5}{7}$ Ans.

What is the Cube root of $\frac{324}{1500}$

First $\frac{324}{1500} = \frac{27}{125}$

Then $\sqrt[3]{\frac{27}{125}} = \frac{3}{5}$ Ans^{r}

Surds

What is the Cube root of $\frac{4}{7}$

$\sqrt[3]{4,000000000}$

,571420571

,571420571 6029 Ans^{r}

Divisor 512

$300 \times 3 = 192$ 59420 resolvend

8 Cube of 2

96 $20 \times 3 \times 300 \times 2$

304 Divisor $\times 2$

39360 subtrahend

Divisor
1997 02 X 3 = 201702 | 200605 71 resolvend
729 Cube of 9
19926 02 X 3 X 9 of 9
101540 Divisor X 9
1035470 9 subtrahend
1705702 resolvend

.029
.029
7461
1650
6632
6072441
.029
61051169
1374402
5497920
1705702
.571420571

What is the Cube root of $\frac{2}{3}$

3) 2,000000000
,666666666

,666666666 (,873 + Ans
Divisor 512
Sq of 8 X 3 = 192) 154666 resolvend
347 Cube of 7
1176 8 X 3 X Sq of 7
1344 Divisor X 7
Divisor 146503 Subtrahend
Sq of 87 X 3 = 22707) 1636666 resolvend
27 Cube of 3
2349 87 X 3 X Sq of 3
60121 Divisor X 3
6035617 subtrahend
1320049 resolvend

,873
,873
2619
6111
6904
762129
873
2206307
5334903
6097032
1320049
,666666666

To extract Cube root of a mixed Number

Rule. Reduce the fractional part to its lowest terms and then the mixed number to an improper fraction extract the cube roots of the numerator and denominator for a new numerator and denominator; but if the mixed number given be a Surd reduce the fractional part to a decimal annex it to the whole number and extract the root therefrom.

What is the Cube root of $12\frac{19}{27}$

First $12\frac{19}{27} = \frac{343}{27}$

Then $\sqrt[3]{\frac{343}{27}} = \frac{7}{3} = 2\frac{1}{3}$ Ans^{r}

What is the Cube root of $7\frac{1}{5}$

$5\overline{)1,0}$

$\frac{2}{7}$

$7,2$

$7,200000\,(1,93 +$ Ans^{r}

Divisor

Sq of $1 \times 3 = 3\overline{)6200}$ resolvend

729 Cube of 9

243 $1 \times 3 \times$ Sq of 9

27 Divisor $\times 9$

5059 subtrahend

Divisor

Sq of $19 \times 3 = 1083\overline{)341000}$ resolvend

27 Cube of 3

513 $19 \times 3 \times$ Sq of 3

3249 Divisor $\times 3$

330057 subtrahend

10943 resolvend

1,93
1,93

579
1737
1937

372493
193

1117477
3352431
372493
10943

7,200000

Between Two numbers given to find Two mean proportionals

Rule. Divide the greater extreme by the less and the Cube root of the quotient multiply by the less extreme gives the less mean multiply the said Cube root by the less mean and the product will be the greater mean proportional

What are the two mean proportionals between 6 and 162

$$6 \overline{)\,162\,} \quad 27$$

Then $\sqrt[3]{27} = 3 \times 6 = 18$ and 54 Ans

What are the two mean proportionals between 4 and 100

$$4 \overline{)\,100\,} \quad 27$$

Then $\sqrt[3]{27} = 3 \times 4 = 12$ and 36 Ans

Wm Wilson

To find the side of a cube that shall be equal in solidity to any given solid as a Globe, cylinder, piston, cone

Rule. The cube root of the solid content of any solid body given is the side of the cube of equal solidity

If the solid content of a Globe is 10640 what is the side of the cube of equal solidity

Divisor
Sq of 2×3 = 12 | 10640 (22 Ans
8
2640 resolvend
8 Cube of 2
24 2×3×Sq of 2
24 Divisor × 2
2640 subtrahend

22
22
44
44
484
22
968
968
10640

The side of the cube being given to find the side of the cube that shall be double triple &c in quantity to the cube given

Rule Cube the side given and multiply it by 2. 3 &c the cube root of the product is the side sought

There is a cubical vessel whose side is 12 inches and it is required to find the side of another vessel that is to contain 3 times as much

1728
3
5184000000000 (17.306 Ans
Divisor 1
Sq of 1 x 3 = 3 | 4184 resolvend
343 Cube of 7
147 7 x 3 x Sq of 7
21 Divisor x 7
3913 subtrahend
Divisor 27 | 271000 resolvend
Sq of 17 x 3 = 867 27 Cube of 3
459 17 x 3 x Sq of 3
2601 Divisor x 3
264717 subtrahend
Divisor 6 | 2053000000 resolvend
Sq of 730 x 3 = 1597200 216 Cube of 6
106040 730 x 3 x Sq of 6
53872200 Divisor x 6
53900086616 subtrahend
9393113384 resolvend